REMARKS

Favorable reconsideration is respectfully requested in view of the foregoing amendments and following remarks.

Claim 11 has been amended to more particularly point out and distinctly claim the subject matter of this invention over the prior art. Support for the amendment is found on page 12, line 3 of the specification.

Turning to the Official Action, claims 11, 53 and 54 are objected to on the basis that it is unclear how the diffraction grating forming means can contact a portion of the curable compound.

An example of how the diffraction grating forming means can contact a portion of the curable compound is shown in Figures 8 and 11 of the specification.

Thus, it is believed that this feature of the claims is clear based upon the teachings of the specification and the knowledge in the art.

Claims 11, 53 and 54 are rejected under 35 USC 103 as unpatentable over D'Amato et al. in view of Meikka et al. This ground of rejection is respectfully traversed as applied to the amended claims.

THE CLAIMED INVENTION

According to the most preferred embodiment, the method of the present invention comprises the following steps as shown in Fig. 8:

(a) a filmic substrate (1) is coated with an ultra violet curable lacquer, or a solvent lacquer (2) on its upper surface, especially a filmic substrate (1) is printed with an ultra violet curable lacquer (2) on its upper surface,

(b) a (sub-microscopic) holographic diffraction grating is cast (transferred) (3) into the surface of the lacquer (2) with a nickel shim, or polymeric shim (4) having the holographic grating thereon,

(c) the holographic image in the form of a diffraction grating is imparted into the lacquer and instantly cured (5), for example via a U. V. lamp, or electron beam radiation;

(d) a metallic ink (6) is printed (7) over the holographic grating and causes the holographic diffraction grating to become light reflective, and

(e) optionally further colors (8) are subsequently printed in-line (reference is made to Figure 1 of WO05/051675).

The holographic diffraction grating transfer takes place in-line on an existing press. There is no need to metallise the imaged substrates off-line. It is possible to print OVD's (Optically Variable Devices) at gravure press speeds – from plain substrate to finished printed product – at an economy of scale not thought possible until this invention.

The structure of the product obtained by the above process of claim 11 is shown in Fig. 12 of the present application:

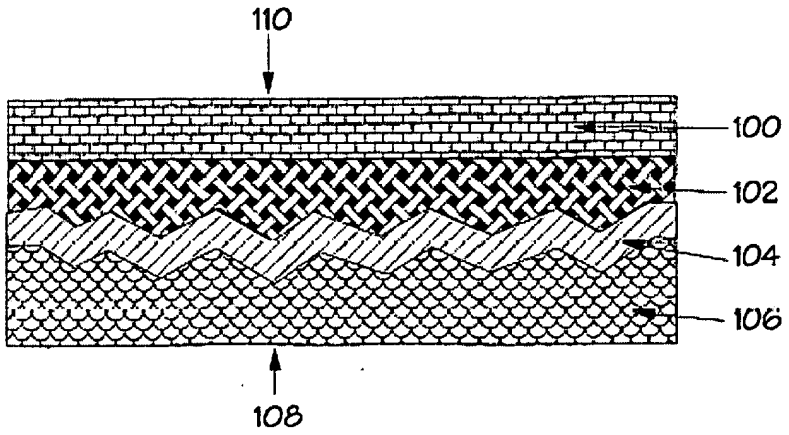

FIG.12.

The product comprises a film substrate 100, a (UV curable) lacquer 102 and a holographic or other sub-microscopic diffraction grating 104 with metallic ink 106 printed over with both first 108 and second surfaces 110 viewable.

It must be emphasized that a particular characteristic of the product of the present invention is that the created holographic image may be viewable from the first and second surface, because a translucent metallic ink is used, the optical density of which when deposited is in the range of 0.2 to 0.8.

In addition, the metallic ink can be printed in specified areas in register with the embossed image.

USP 4,933,120 (D1) (D'AMATO et al.)

USP 4,933,120 relates to a method of treating sheet material of a given area, comprising the steps of:

printing a visual pattern on at least one side of said sheet material,

providing a transfer surface containing at least one physically defined area of a discrete surface relief light diffraction pattern that is significantly less than the sheet material given area,

applying casting resin in liquid form to said at least one discrete pattern area in a manner to substantially avoid coating any other areas of said transfer surface,

contacting said at least one side of said sheet material with said resin coated discrete pattern area, thereby to contact said sheet material with said resin in a discrete area corresponding to the discrete pattern area of the transfer surface, said contacting step occurring sometime after the printing step,

directing actinic radiation to said resin in a manner to harden said resin and cause it to adhere to said sheet material while being held against the sheet material by the transfer surface relief pattern without movement therebetween,

separating said transfer sheet discrete pattern area from the hardened resin, thereby to leave the hardened resin in place on said sheet material with the surface relief pattern contained therein, and

coating substantially only the hardened resin in said discrete area with a reflective material in a manner to follow the surface relief pattern, whereby said sheet material is treated with both conventional printing and a light diffraction pattern (D1, claim 1).

According to D1, column 6, line 37, the coating with the reflective material is done by physical vapour deposition of the metal. A mask technique is used for discrete area metallization.

The process of D1 is distinguished from that of the present invention in that the metal is vapor deposited in D1, whereas a metallic ink is used according to the present invention to form the metal layer.

One advantage of the process of the present invention lies in the fact that the holographic diffraction grating transfer takes place in-line on an existing (printing) press. That is, there is no need to metallise the imaged substrates off-line by vapour deposition.

A further disadvantage of vapor deposition is that the metal can only be applied as a uniform coating or, by using appropriate masks, in swipes running in the machine (long) direction of the plastic film web. If it is desired to create a discreet metallised pattern, this is usually accomplished by first metallising the surface overall, then etching away the unwanted metal by use of a corrosive etchant such as caustic soda or an acid.

Another advantage of the product of the present invention against the product(s) of D1 is that the created holographic image may be viewable from the first and second surface, because a translucent metallic ink is used, the optical density of which when deposited is in the range of 0.2 to 0.8.

In addition, according to the present invention, the metallic ink can be printed in specified areas in register with the embossed image,.

Accordingly, D1 neither teaches nor suggests the subject matter of the present application.

USP 6,666,995 (D2) (MEIKKA et al.)

D2 relates to a process for preparing finely divided particles, each of which has at least one embossed surface, comprising the steps of:

(a) providing a sheet having a first side and a second side, at least one side of which has an embossment, in which said embossment comprises a diffraction grating pattern, a holographic image pattern, or a machine readable image visible solely by optical magnification;

(b) depositing, in the form of a thin film having an inside surface and outside surface, an optically-effective material onto said embossment, so that the inside surface of the film adopts the complement of the embossment;

(c) passing said sheet with said film of said material through a release environment which causes said film to separate from the sheet but which is non-destructive of said material, and

(d) removing said film of said material from said sheet in a particulate form to produce the particles, and collecting the particles in a solvent which is non-reactive with said material (D2, claim 1).

In other words it was the general object of D2 to provide a process for making very thin, bright embossed metallic flake pigments rapidly and inexpensively.

The embossed metallic flake pigments may be processed into a lacquer or printing ink formulation. The embossment present on each individual flake of pigment, in random orientation, primarily in two-dimensions, creates a unique iridescent effect if the embossment is a diffraction pattern or hologram.

The metal particles of D2 are embossed (--> holographic aluminium particles), whereas the ones used in the process of the present invention are not embossed.

According to the present invention, a filmic substrate is printed with an ultra violet curable lacquer on its upper surface, (b) a (sub-microscopic) holographic diffraction grating is cast (transferred) into the surface of the lacquer with a nickel shim, or polymeric shim having the holographic grating thereon, (c) the holographic image in the form of a diffraction grating is imparted into the lacquer and instantly cured (5), and (d) a metallic ink (6) is printed (7) over the holographic grating while causes the holographic diffraction grating to become light reflective. In contrast according to D2, the embossed metallic flake pigments are used to create a (randomly oriented) iridescent effect.

D2 does not give any hint which would enable the person skilled in the art to arrive at the subject matter of the present application even taking into consideration the teachings of D1.

Hence, the subject matter of the present application is not obvious in view of D1 in combination with D2.

In view of the foregoing, it is believed that each ground of rejection set forth in the Official Action has been overcome, and that the application is now in condition for allowance. Accordingly, such allowance is solicited.

The Commissioner is authorized to charge any deficiency or to credit any overpayment associated with this communication to Deposit Account No. 23-0975, with the EXCEPTION of deficiencies in fees for multiple dependent claims in new applications.

Respectfully submitted,
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